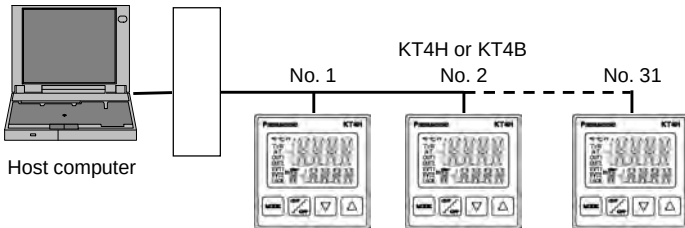


These instructions are for communication functions. For detailed operating instructions, please refer to User's Manual for the KT4H/B.

Serial communication and Tool port communication cannot be used together. When performing Serial communication, remove the tool cable (AKT4H820) from the USB port of the PC and tool connector of the KT4H/B. When performing Tool port communication, it is not required to remove the Serial communication cables. However, do not send a command from the master side.

5. System configuration

Communication converter
RS-232C ↔ RS-485

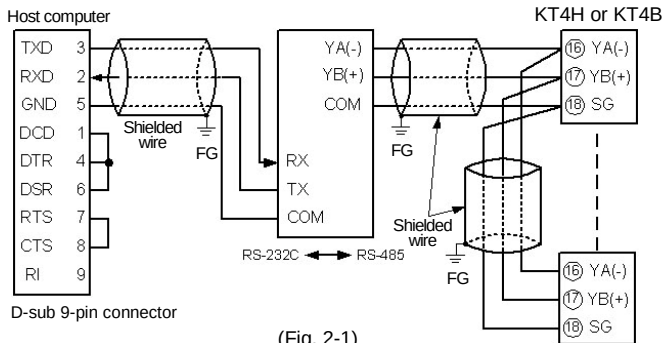


(Fig. 1-1)

2. Wiring

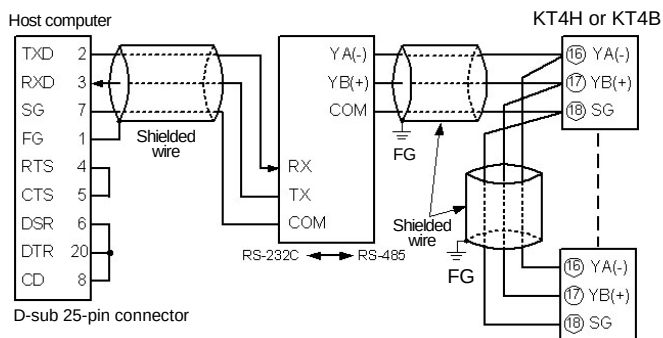
Wiring example using a communication converter

Using a D-sub 9-pin Connector



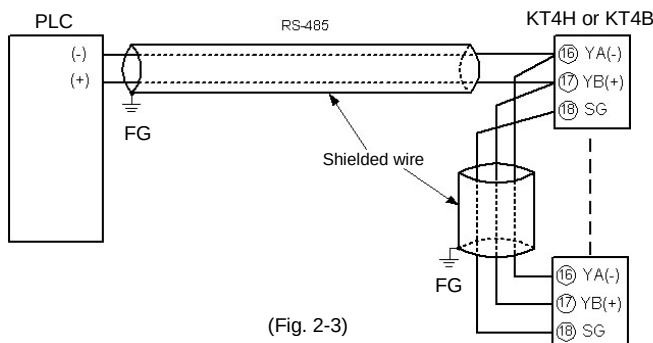
(Fig. 2-1)

Using a D-sub 25-pin Connector



(Fig. 2-2)

When connecting to a PLC (RS-485)



(Fig. 2-3)

Shielded wire

Connect only one side of the shielded wire to the FG terminal so that current cannot flow to the shielded wire. If both sides of the shielded wire are connected to the FG terminal, the circuit will be closed between the shielded wire and the ground. As a result, current will run through the shielded wire and this may cause noise. Be sure to ground the FG terminal.

Terminator (Terminal resistor)

Do not connect terminator with the communication line because each KT4H/B has built-in pull-up and pull-down resistors instead of a terminator.

If there is a large distance between the PLC and the KT4H/B, connect the terminator on the PLC side. (Connect a terminator of 120Ω or more resistance.)

3. Communication parameter setting

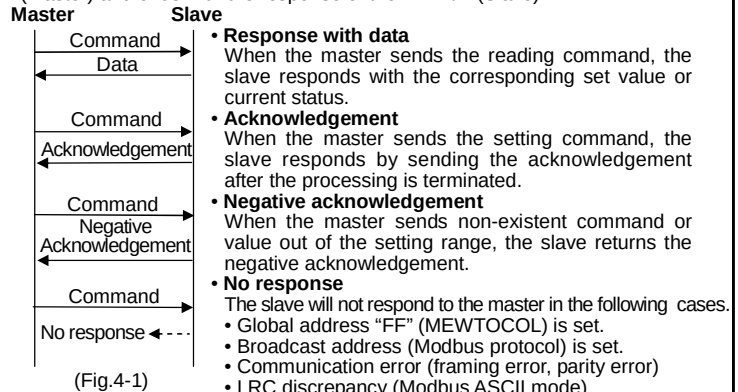
Set each communication parameter following the procedures below.

- (1) **Proceed to Auxiliary function setting mode.**
Press **MODE** key while pressing **▽** key in the PV/SV display mode. The unit proceeds to Auxiliary function setting mode.
- (2) **Auxiliary function setting mode**
Press **MODE** key twice.
The unit proceeds to Communication protocol selection.
- (3) **Communication protocol selection**
Select the communication protocol.
ModR : Modbus ASCII mode (Default)
ModR : Modbus RTU mode
MEW : MEWTOCOL (Slave)
- (4) **Instrument number setting**
Set the instrument number of the controller individually when communicating by connecting plural instruments.
1 to 99 (Default: 1)
- (5) **Communication speed selection**
Set the communication speed equal to that of the host computer.
24 : 2400bps
48 : 4800bps
96 : 9600bps (Default)
192 : 19200bps
- (6) **Data bit/Parity selection**
Select the data bit and parity.
8NO : 8 bits/No parity
7NO : 7 bits/No parity
8E : 8 bits/Even
7E : 7 bits/Even (Default)
8O : 8 bits/Odd
7O : 7 bits/Odd
- (7) **Stop bit selection**
Select the stop bit.
1 : 1 (Default)
2 : 2
- (8) **Communication response time setting**
Set the minimum response time.
5 to 99 (Default: 5ms)

Numbers such as [17], [19], etc. are setting item numbers. Refer to the User's Manual for the KT4H/B.

4. Communication procedures

Communication starts with command transmission from the host computer (Master) and ends with the response of the KT4H/B (Slave).



(Fig. 4-1)

RS-485 communication timing

Master side (Notice on programming)

Set the program so that the master can disconnect the transmitter from the communication line within a 1 character transmission period after sending the command in preparation for reception of the response from the slave. To avoid the collision of transmissions between the master and the slave, send the next command after carefully checking that the master received the response.

Slave side

When the slave starts transmission through the communication line, the slave is arranged so as to provide an idle status (mark status) transmission period of 5ms or more (communication response time from 5 to 99ms settable) before sending the response to ensure the synchronization on the receiving side. The slave is arranged so as to disconnect the transmitter from the communication line within a 1 character transmission period after sending the response.

5. Specifications

Communication system	Half duplex
Cable length	: 1,000m (Max.), cable resistance 50Ω or less (Terminator: None or 120Ω or more on PLC side)
Communication line	: EIA RS-485
Communication speed	: 9600bps (2400, 4800, 9600, 19200bps) Selectable by key
Synchronous system	: Start-stop synchronous
Code	: ASCII (Modbus ASCII, MEWTOCOL), Binary (Modbus RTU)
Error correction	: Command request repeat system

About User's Manual

- Please download User's Manual at <http://panasonic-denko.co.jp/ac/e/>
- For the detailed usage and User's Manual, please contact us at the address below.

Panasonic[®]

Installation Instructions

KT4H/B Temperature Controller

No. KT4HE5 2009.07

To ensure safe and correct use, thoroughly read and understand these instructions before using this instrument. For detailed usage and options, please refer to User's Manual for the KT4H/B.

SAFETY PRECAUTIONS

(Be sure to follow the precautions described below to prevent injury or accidents.)

The safety precautions are classified into categories: "Warning" and "Caution".

Warning: Procedures which may lead to dangerous conditions and cause death or serious injury, if not carried out properly.

Caution: Procedures which may lead to dangerous conditions and cause superficial to medium injury or physical damage or may degrade or damage the product, if not carried out properly.

Warning

- When using this controller on occasions which serious injury would be expected to occur or when damage is likely to expand or proliferate, make sure to take safety measures such as installing double safety structures.
- Do not use this controller in an environment with flammable gases, or it may cause explosion.

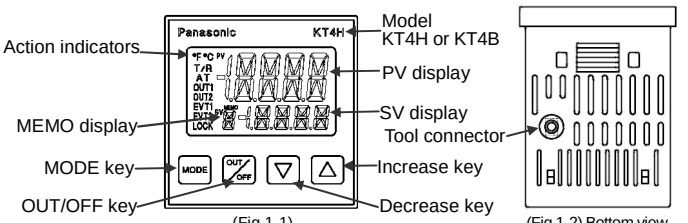
Caution

- Fasten the electric wire with the terminal screws securely. Imperfect connection may cause abnormal heating or fumes.
- Use this controller according to the rating and environmental conditions. Otherwise abnormal heating or fumes may occur.
- Do not touch the terminals while the power is supplied to the controller, as this may cause electric shock.
- Do not disassemble or modify the controller, as this may cause electric shock or fumes.

Caution

- This instrument should be used in accordance with the specifications described in these instructions. If it is not used according to the specifications, it may malfunction or cause fire.
- Be sure to follow the warnings, cautions and notices. Not doing so could cause serious injury or accidents.
- The contents of this booklet are subject to change without notice.
- This instrument is designed to be installed in a control panel. If not, measures must be taken to ensure that the operator cannot touch power terminals or other high voltage sections.
- Be sure to turn the power supply to the instrument OFF before cleaning this instrument.
- Use a soft, dry cloth when cleaning the instrument.
(Alcohol based substances may tarnish or deface the unit.)
- As the display section is vulnerable, do not strike or scratch it with a hard object.
- Any unauthorized transfer or copying of this document, in part or in whole, is prohibited.
- Matsushita Electric Works, Ltd. is not liable for any damages or secondary damages incurred as a result of using this product, including any indirect damages.

1. Name and functions of the sections



MODE key: Selects the setting mode, or registers the set value.

OUT/OFF key: Switches control output ON/OFF or Auto/Manual control.

Increase key: Increases the numeric value.

Decrease key: Decreases the numeric value.

PV display: Indicates the PV (process variable).

SV display: Indicates the SV (main set value).

MEMO display: Indicates the set value memory number.

Action indicators

°F/°C: Temperature unit °F or °C lights when selected.

TX: Lights when Serial communication (option) is performing (TX output).

AT: Flashes while AT(auto-tuning) or auto-reset is performing.

OUT1: Lights when control output is ON or when Heating output (option) is ON.
Flashes when corresponding to the MV in 0.25 second cycles for DC current output type.

OUT2: Lights when cooling output (option) is ON.

EVT1: Lights when Alarm 1 output is ON.

EVT2: Lights when Alarm 2 output (option) is ON or Heater burnout alarm (option) is ON.
Lock 2 or Lock 3 is selected.

Tool connector: The following operations can be conducted from external computer by connecting the tool cable (sold separately). (1) Reading and setting of SV, PID and various set values, (2) Reading of PV and action status, (3) Function change

2. Mounting to the control panel

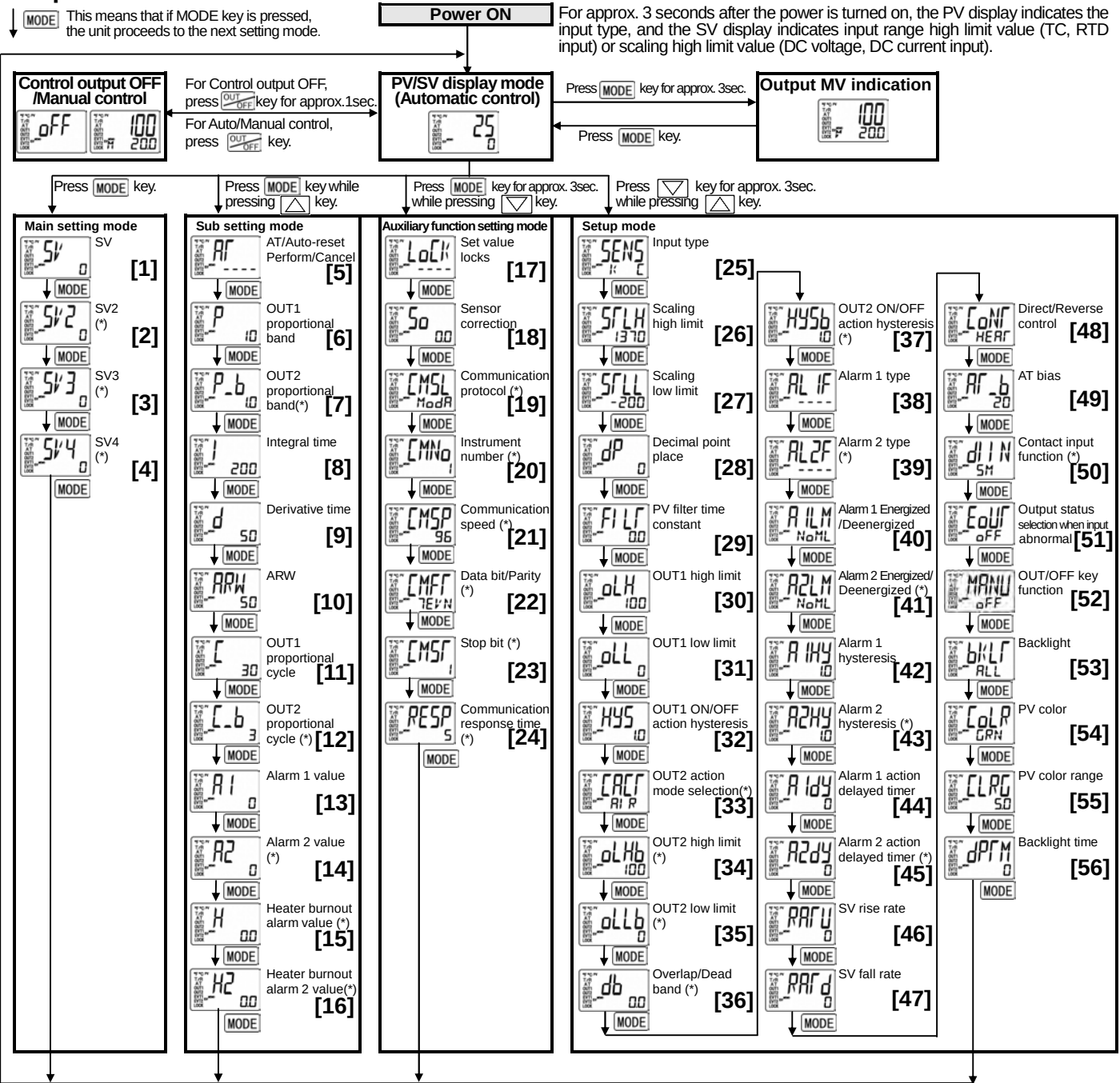
2.1 Site selection

This instrument is intended to be used under the following environmental conditions (IEC61010-1): **Overvoltage category II, Pollution degree 2**

Ensure the mounting location corresponds to the following conditions:

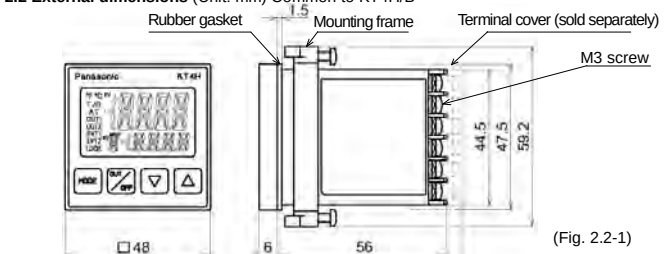
- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gases
- Few mechanical vibrations or shocks
- No exposure to direct sunlight, an ambient temperature of 0 to 50°C (32 to 122°F) that does not change rapidly
- An ambient non-condensing humidity of 35 to 85%RH
- No large capacity electromagnetic switches or cables through which large current is flowing
- No water, oil or chemicals or where the vapors of these substances can come into direct contact with the controller

5. Operation flowchart

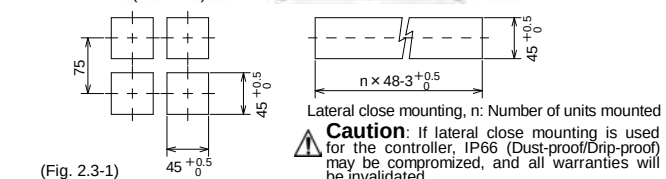


(*) : Setting items with (*) are optional, and they appear only when the options are added. Numbers such as [1], [2], etc. are setting item numbers in the User's Manual.

2.2 External dimensions (Unit: mm) Common to KT4H/B



2.3 Panel cutout (Unit: mm)



2.4 Mounting and removal to/from the control panel

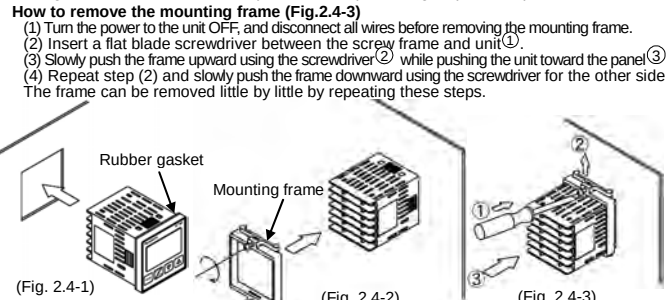
How to mount the KT4H/B (Fig.2.4-1, Fig.2.4-2)

Mount the controller vertically to ensure it adheres to the Dust-proof/Drip-proof specification (IP66). Mountable panel thickness: Within 1 to 5mm

- Insert the controller from the front side of the panel.
- Insert the mounting frame until the frame tips come into contact with the panel, and fasten with screws. Tighten screws with one rotation upon the screw tips touching the panel. Torque: 0.05 to 0.06N·m.

How to remove the mounting frame (Fig.2.4-3)

- Turn the power to the unit OFF, and disconnect all wires before removing the mounting frame.
- Insert a flat blade screwdriver between the screw frame and unit.
- Slowly push the frame upward using the screwdriver while pushing the unit toward the panel.
- Repeat step (2) and slowly push the frame downward using the screwdriver for the other side. The frame can be removed little by little by repeating these steps.



3. Wiring

Warning

Turn the power supply to the instrument off before wiring or checking it. Working or touching the terminal with the power switched on may result in severe injury or death due to Electric Shock.

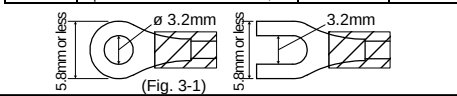
Caution

- The terminal block of this instrument is designed to be wired from the left side. The lead wire must be inserted from the left side of the terminal, and fastened by the terminal screw. The torque is approximately 0.63N·m.
- When using a terminal cover (AKT4H801), pass terminal wires numbered 7 to 12 into the holes of the terminal cover. See (Fig. 3-2).
- To extend a thermocouple's lead wire, be sure to use a compensating lead wire in accordance with the sensor input specification. (If any other compensating lead wire is used, a temperature indication error may be caused.)
- Use the 3-wire RTD which corresponds to the input specification of this controller. This controller does not have a built-in power switch, circuit breaker or fuse. Therefore, it is necessary to install them in the circuit near the external controller. (Recommended fuse: Time-lag fuse, rated voltage 250V AC, rated current 2A)
- For a 24V AC/DC power source, do not confuse polarity when using direct current (DC).
- When using a relay contact output type, externally use a relay according to the capacity of the load to protect the built-in relay contact.
- When wiring, keep input wires (thermocouple, RTD, etc.) away from AC sources or load wires to avoid external interference.
- If Alarm 2 and Heater burnout alarm are added together, they (EVT2) utilize common output terminals.

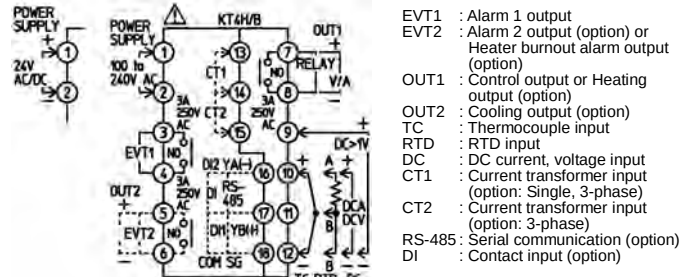
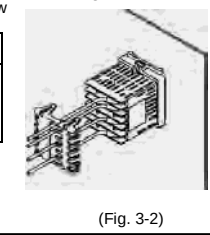
Lead wire solderless terminal

Use a solderless terminal with an insulation sleeve in which an M3 screw fits as shown below. The torque is approximately 0.63N·m.

Solderless terminal	Manufacturer	Model name	Tightening torque
Y type	Nichifu Terminal Industries Co.,Ltd.	TMEV1.25Y-3	0.63N·m
Round type	Japan Solderless Terminal MFG Co.,Ltd.	VD1.25-B3A	
	Nichifu Terminal Industries Co., Ltd.	TMEV1.25-3	



When using a Terminal cover



Wiring of Heater burnout alarm (single, 3-phase)

This alarm is not usable for detecting heater current under phase control. Use the current transformer (CT) provided, and pass one lead wire of the heater circuit into the hole of the CT. (Fig.3-4) When wiring, keep the CT wire away from AC sources or load wires to avoid the external interference. In the case of 3-phase, pass any 2 lead wires of R, S, T into the CT, and connect them with CT1 (13, 14) and CT2 (14, 15) terminals.

4. Operation

After the unit is mounted to the control panel and wiring is completed, operate the unit following the procedures below.

(1) Turn the power supply to the KT4H/B ON.

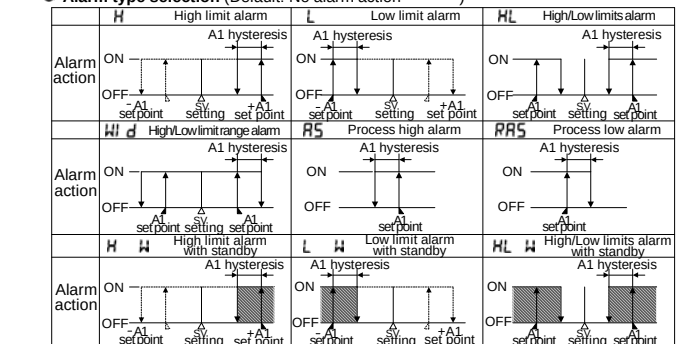
(2) Initial settings

Refer to "5. Operation flowchart", "6. Basic operation" and "7. AT Perform/Cancel". Select an input type, alarm type, Direct/Reverse action, etc. during Setup mode. If initial settings are not required, skip this step, and proceed to Setup (3).

Input type selection (Default: K, -200 to 1370 °C)

Input type	Input range	Output range
K	-200 to 1370 °C	-320 to 2500 °F
J	-200.0 to 400.0 °C	-320.0 to 750.0 °F
R	-200 to 1000 °C	-320 to 1800 °F
S	0 to 1760 °C	0 to 3200 °F
B	0 to 1760 °C	0 to 3200 °F
E	0 to 1820 °C	0 to 3300 °F
T	-200 to 800 °C	-320 to 1500 °F
N	-200.0 to 400.0 °C	-320.0 to 750.0 °F
PL-II	-200 to 1300 °C	-320 to 2300 °F
PL-1	0 to 1390 °C	0 to 2500 °F
C(W/Re5-26)	0 to 2315 °C	0 to 4200 °F
PT100	-200.0 to 850.0 °C	-320.0 to 1500.0 °F
JP100	-200.0 to 500.0 °C	-320.0 to 900.0 °F
PT100	-200 to 850 °C	-320 to 1500 °F
JP100	-200 to 500 °C	-320 to 900 °F
4 to 20mA	-2000 to 10000 [Connect 50Ω shunt resistor (AKT4810, sold separately).]	
0 to 20mA		
0 to 1V		
0 to 5V		
1 to 5V		
0 to 10V		

Alarm type selection (Default: No alarm action " - - - ")



Alarm Energized/Deenergized selection

[Default: EVT1 contact output ON (Energized) NoML]

NoML: EVT1 contact output ON (Energized) REVS: EVT1 contact output OFF (Deenergized)

Direct/Reverse action selection (Default: Reverse (Heating) HEAR)

HEAR: Reverse action (Heating), COOL: Direct action (Cooling)

OUT/OFF key function selection (Default: OUT/OFF function OFF)

OFF: OUT/OFF function, MANUAL: Auto/Manual control function

Set value lock selection (Default: Unlock " - - - ")

LoC1: Lock 1 (All set values are locked)

LoC2: Lock 2 (All set values except SV are locked)

LoC3: Lock 3 (Set values can be changed temporarily, however, after the power is turned off and on, they return to their previous values.)

(4) Turn the load circuit power ON.

Control action starts so as to keep the control target at the SV (desired value).

6. Basic operation

(Main setting mode, When setting SV to 100°C)

- Proceed to the Main setting mode.**
Press **MODE** key in the PV/SV display mode.
The unit proceeds to the Main setting mode.
- Set SV.**
Set SV with **▲** or **▼** key.
- Register the SV.**
Register the SV by pressing **MODE** key.
The unit reverts to the PV/SV display mode.
- Control starts.**
Control starts so as to keep the measuring temperature at 100°C.

7. AT Perform/Cancel (PID action)

In order to set each value of P, I, D and ARW automatically, the auto-tuning process should be made to fluctuate to obtain an optimal value. Sometimes the auto-tuning process will not fluctuate if auto-tuning is performed at or near room temperature. Therefore auto-tuning might not finish normally.

- Proceed to the Sub setting mode.**
Press **MODE** key while pressing **▲** key in the PV/SV display mode. The unit proceeds to the Sub setting mode.
- Select AT Perform/Cancel.**
Select AT Perform with **▲** key, or select AT Cancel with **▼** key.
- Confirm AT Perform/Cancel.**
Press **MODE** key.
The unit reverts to the PV/SV display mode.
- AT Perform/Cancel**
While AT is performing, the AT indicator flashes, and it goes off when AT is cancelled.

Auto-reset can be performed during P or PD action. Auto-reset is cancelled in approximately 4 minutes. It cannot be released while performing this function.

8. Specifications

Power supply: 100 to 240V AC 50/60Hz, or 24V AC/DC 50/60Hz
Allowable fluctuation range: 100 to 240V AC: 85 to 264V AC, 24V AC/DC : 20 to 28V AC/DC

Indication accuracy

Thermocouple: Within ±0.2% of each input span±1digit, or within ±2°C(4°F), whichever is greater
However, for R, S inputs, 0 to 200°C (0 to 400°F): Within ±6°C (12°F)
B input, 0 to 300°C (0 to 600°F): Accuracy is not guaranteed.
K, J, E, T, N inputs, less than 0°C (32°F): Within ±0.4% of input span±1digit
RTD: Within ±0.1% of each input span ±1digit, or within ±1°C (2°F), whichever is greater
DC current, voltage input: Within ±0.2% of each input span ±1digit

Control output 1

Relay contact: 1a, Control capacity, 3A 250V AC (resistive load) 1A 250V AC (inductive load cosφ=0.4)
Electric life: 100,000 cycles
Non-contact voltage (For SSR drive): 12V DC±15% Max. 40mA (short circuit protected)
DC current: 4 to 20mA DC, Load resistance, Max. 550Ω

Alarm 1 output, Alarm 2 output, Heater burnout alarm output

Relay contact 1a, Control capacity, 3A 250V AC (resistive load), Electric life, 100,000 cycles
Non-contact voltage (For SSR drive): 12V DC±15%, Max. 40mA DC (short circuit protected)

Contact input

Circuit current when closed: Approx. 6mA

Power consumption : Approx. 8VA

Ambient temperature, humidity: 0 to 50°C (32 to 122°F), 35 to 85%RH (no condensation)

Weight : Approx. 120g

Accessories included: Mounting frame 1 piece, Rubber gasket (Mounted to the unit) 1 piece,

Installation instructions 1 copy

Heater burnout alarm Single phase 20A: CT1 (AKT4815), 50A: CT2 (AKT4816) 1 piece each

Heater burnout alarm 3-phase 20A: CT1 (AKT4815), 50A: CT2 (AKT4816) 2 pieces each

Accessories sold separately: Terminal cover (AKT4H801), Shunt resistor (AKT4810 (50Ω))

Tool cable (AKT4H820)

About User's Manual

- Please download User's Manual at <http://www.nais-e.com/download/index.html>
- For the detailed usage and User's Manual, please contact us at the address below.

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Facsimile : Japan (81) Osaka (06) 6908-5781 : This product has been developed/produced for industrial use only.